(19) Canadian Intellectual Property Office
An Agency of Industry Canada

Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

(11) CA 2 435 913 (13) A1

(40) 26.09.2002
(43) 26.09.2002

(12)

(21) 2 435 913

(22) 06.03.2002

(51) Int. Cl.[7]: B01F 13/00

(85) 24.07.2003

(86) PCT/EP02/02481

(87) WO02/074426

(30) 101 12 904.1 DE 15.03.2001

(71) 3M ESPE AG,
Espe Platz
D-82229, SEEFELD, XX (DE).

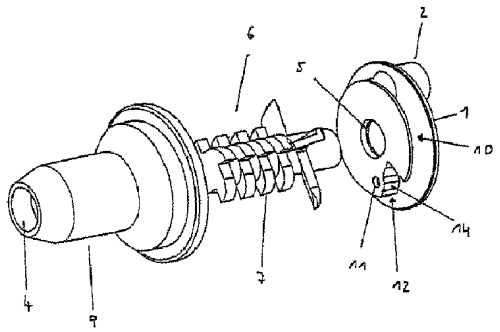
(72) PAUSER, HELMUT (DE).
WAGNER, INGO (DE).

(74) KIRBY EADES GALE BAKER

(54) MELANGEUR DYNAMIQUE
(54) DYNAMIC MIXER

(57)

The invention relates to a dynamic mixer for mixing at least two paste components of different volume proportions. Said mixer comprises a housing with at least two inlet openings and at least one outlet opening, a mixer element being rotatably mounted in a mixing chamber of said housing. The housing has at least one delay chamber comprising a limiting wall that blocks the paste stream in the direction of flow and at least one opening that opens into the mixing chamber, said opening(s) being set back in relation to the limiting wall. The mixer is particularly suitable for mixing paste components with a relatively high viscosity of, for example, greater than 800 Pas.



Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2435913 A1 2002/09/26

(21) 2 435 913

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(86) Date de dépôt PCT/PCT Filing Date: 2002/03/06
(87) Date publication PCT/PCT Publication Date: 2002/09/26
(85) Entrée phase nationale/National Entry: 2003/07/24
(86) N° demande PCT/PCT Application No.: EP 2002/002481
(87) N° publication PCT/PCT Publication No.: 2002/074426
(30) Priorité/Priority: 2001/03/15 (101 12 904.1) DE

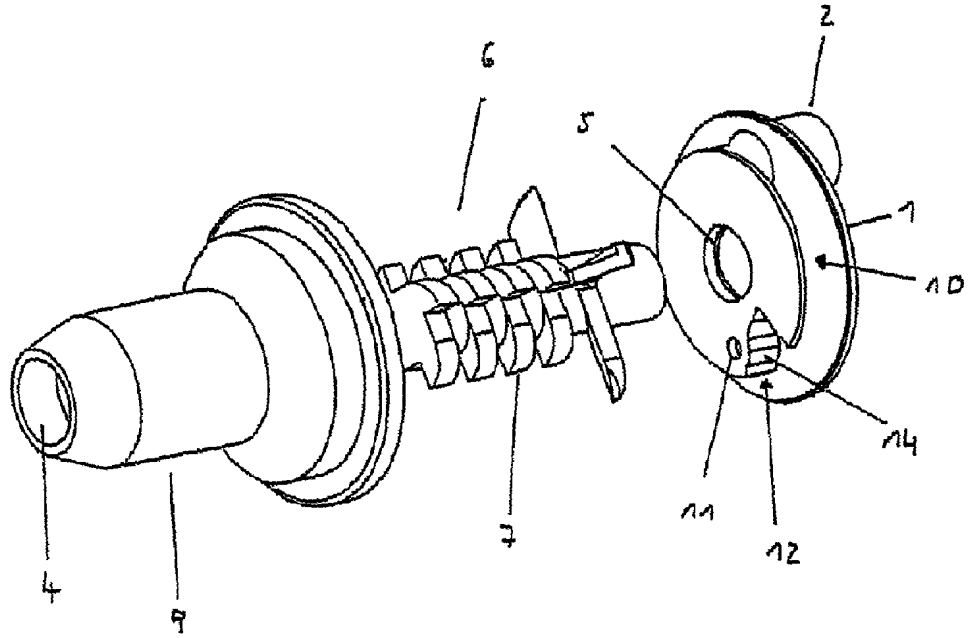
(51) Cl.Int.^{7}/Int.Cl.^{7} B01F 13/00

(71) Demandeur/Applicant:
3M ESPE AG, DE

(72) Inventeurs/Inventors:
PAUSER, HELMUT, DE;
WAGNER, INGO, DE

(74) Agent: KIRBY EADES GALE BAKER

(54) Titre : MELANGEUR DYNAMIQUE
(54) Title: DYNAMIC MIXER



(57) Abrégé/Abstract:
The invention relates to a dynamic mixer for mixing at least two paste components of different volume proportions. Said mixer comprises a housing with at least two inlet openings and at least one outlet opening, a mixer element being rotatably mounted in a mixing chamber of said housing. The housing has at least one delay chamber comprising a limiting wall that blocks the paste stream in the direction of flow and at least one opening that opens into the mixing chamber, said opening(s) being set back in relation to the limiting wall. The mixer is particularly suitable for mixing paste components with a relatively high viscosity of, for example, greater than 800 Pas.

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum
Internationales Büro

(43) Internationales Veröffentlichungsdatum
26. September 2002 (26.09.2002)

PCT

(10) Internationale Veröffentlichungsnummer
WO 02/074426 A1

(51) Internationale Patentklassifikation[7]: B01F 13/00

(21) Internationales Aktenzeichen: PCT/EP02/02481

(22) Internationales Anmeldedatum:
6. März 2002 (06.03.2002)

(25) Einreichungssprache: Deutsch

(26) Veröffentlichungssprache: Deutsch

(30) Angaben zur Priorität:
101 12 904.1 15. März 2001 (15.03.2001) DE

(71) Anmelder *(für alle Bestimmungsstaaten mit Ausnahme von US)*: **3M ESPE AG** [DE/DE]; Espe Platz, 82229 Seefeld (DE).

(72) Erfinder; und

(75) Erfinder/Anmelder *(nur für US)*: **PAUSER, Helmut** [DE/DE]; Metznerwiese 5, 86911 Diessen (DE). **WAGNER, Ingo** [DE/DE]; Auinger Strasse 16, 82237 Wörthsee (DE).

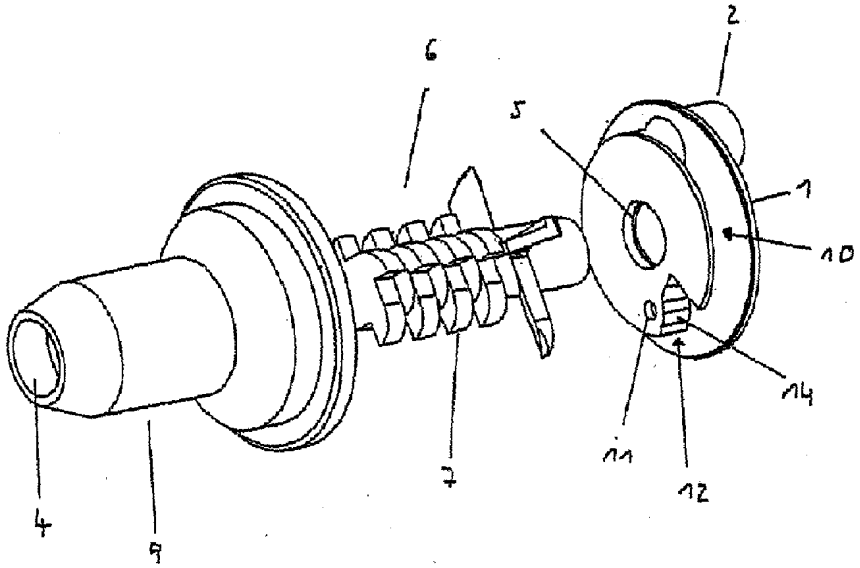
(74) Gemeinsamer Vertreter: **3M ESPE AG**; Espe Platz, 82229 Seefeld (DE).

(81) Bestimmungsstaaten *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

[Fortsetzung auf der nächsten Seite]

(54) Title: DYNAMIC MIXER

(54) Bezeichnung: DYNAMISCHER MISCHER



(57) Abstract: The invention relates to a dynamic mixer for mixing at least two paste components of different volume proportions. Said mixer comprises a housing with at least two inlet openings and at least one outlet opening, a mixer element being rotatably mounted in a mixing chamber of said housing. The housing has at least one delay chamber comprising a limiting wall that blocks the paste stream in the direction of flow and at least one opening that opens into the mixing chamber, said opening(s) being set back in relation to the limiting wall. The mixer is particularly suitable for mixing paste components with a relatively high viscosity of, for example, greater than 800 Pas.

[Fortsetzung auf der nächsten Seite]

WO 02/074426 A1

WO 02/074426 A1

(84) Bestimmungsstaaten *(regional)*: ARIPO-Patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), eurasisches Patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI-Patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Veröffentlicht:

— *mit internationalem Recherchenbericht*

Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

(57) Zusammenfassung: Die Erfindung betrifft einen dynamischen Mischer zum Mischen von mindestens zwei Pastenkomponenten mit unterschiedlichen Volumenanteilen, umfassend ein Gehäuse mit mindestens zwei Einlassöffnungen und mindestens einer Auslassöffnung, in dem ein Mischerelement in einer Mischkammer drehbar gelagert ist, wobei das Gehäuse mindestens eine Verzögerungskammer, die eine den Pastenstrom in Strömungsrichtung stoppende Begrenzungswand und mindestens eine Öffnung aufweist, die in die Mischkammer mündet, wobei diese mindestens eine Öffnung gegenüber der Begrenzungswand zurückversetzt ist. Der Mischen eignet sich insbesondere zum Mischen von Pastenkomponenten mit einer verhältnismäßig hohen Viskosität von beispielsweise größer als 800 Pas.

Dynamic mixer

The present invention relates to a dynamic mixer for mixing at least two paste components with different volume ratios, comprising a housing which has a delay chamber for the paste component with the higher proportion by volume. The mixer is suitable in particular for mixing paste components with a relatively high viscosity of, for example, greater than 800 Pas.

DE 298 18 499 U discloses a mixer for producing pastes from components with different proportions by volume, which has a delay chamber. The latter forms a bypass channel which prolongs the path from an inlet opening to a mixer element and runs along a curve around the longitudinal axis. This mixer constitutes a further development of the dynamic mixer disclosed by EP 0 492 412 A1.

Also known are static mixers, as they are called, which, as opposed to a dynamic mixer, have no moving parts. Mixers of this type are suitable only for mixing and discharging relatively thin substances, cf. EP 0 885 651 A1, EP 0 664 153 A1 or EP 0 584 428 A1.

As distinct from the dynamic mixer, which swirls the components to be mixed, in the static or flow mixer mixing is carried out by repeated stream division.

In the case of mixing with a delay chamber, for reasons connected with reducing the overall length, this is preferably configured in such a way that the paste component flowing in, which enters the mixer longitudinally, is regularly deflected through about 90°. The actual delay section is thus located transversely with respect to the rotatably mounted mixing element, cf. EP 1 099 470 A1.

At the end of the delay section, the paste component either flows directly into the mixing chamber or the paste component enters the mixing chamber offset through about 90°, so that the flow direction of the paste component changes once again.

In this case, the delay chamber can extend both in only one direction with one outlet and in two directions with, correspondingly, two outlets.

The deflection of the entire paste stream of a component induces very high frictional losses in the paste, which increase the flow resistance considerably. The force necessary to convey the pastes, which is transmitted to the pastes via delivery pistons, therefore rises sharply.

It is therefore possible for the dynamic mixers known hitherto to be used only for mixing pastes which have an average consistency and ability to stand without settling. Such pastes usually have a viscosity in the range from 200 to 800 Pas.

However, omitting the delay chamber is not possible, since it is precisely paste with a high ability to stand without settling and a high viscosity in which one component tends to run ahead to a particularly great extent.

The primary object of the present invention is thus to provide an improved mixer, in particular for mixing highly viscous pastes.

This object is achieved by providing a dynamic mixer and a method as described in the claims.

The terms "comprise" or "contain" do not introduce a complete enumeration of features. The circumstance in which, in the claims, the word "one" is used before

citing a feature does not rule out the case in which the aforementioned features can be present in a plurality, in the sense of "at least one".

Surprisingly, it has been shown that, if an opening is made within the delay chamber which is set back with respect to the boundary wall which stops or terminates the paste stream in the flow direction, the function of this chamber - to ensure that no paste component emerges from the mixer unmixed or to ensure a retarded entry into the mixing chamber - remains largely maintained.

The boundary wall is a constituent part of the delay chamber and is regularly located at the point which is most remote from the inlet opening which opens into the delay chamber. Since the delay chamber is normally configured in the manner of an annular segment and runs along a curve about the longitudinal axis of the mixer, the boundary wall represents an end face of the annular segment which, depending on the embodiment, can be planar or curved.

No boundary wall of the delay chamber in the sense of the invention is a baffle surface arranged opposite the inlet opening, which the incoming paste component strikes substantially directly after entering the mixer without being deflected substantially.

Surprisingly, it has been shown that the delay chamber is initially largely completely filled before the paste component enters the actual mixing chamber. This may be explained by a flow resistance produced by the rotating mixing blades, which prevents the paste entering the mixing chamber until the delay chamber has been filled.

The fact that the opening which leads from the delay chamber into the mixing chamber is set back with

respect to the boundary wall means that there is a reduction in the conveying force to be applied by the mixing appliance, since the paste component is deflected only slightly after the delay chamber has been filled, depending on the arrangement of the opening.

The paste component flowing into the delay chamber is initially deflected through about 90° as it flows in and fills the delay chamber without substantially getting into the mixing chamber. Since, in this state, the mixing chamber has not yet been filled, the conveying forces to be applied in this case are relatively uncritical.

However, once the paste stream reaches the boundary wall, the static pressure which builds up has the effect that the paste component gets into the mixing chamber through the set-back opening.

The conveying forces to be applied by the mixing appliance decrease with increasing distance of the opening from the boundary wall, so that even highly viscous materials can be mixed dynamically with the mixer according to the invention.

The mixer according to the invention thus permits the preparation of pastes which, in the case of the component with the greater proportion by volume, have a considerably higher viscosity than 800 Pas, without mechanical overloading of the system, comprising the mixing appliance, the inserted cartridge and the mixer, occurring.

The viscosity may be determined, for example, with a Brookfield DV III rheometer (spindle HB 5, bar width 15.5 mm, speed 5 rpm, reading 20 s after start).

In practical terms, the viscosity can be determined in the following way:

After being switched on and adjusted, the rheometer is provided with the measuring spindle HB5 (bar width = 15.5 mm). The paste to be measured and having the higher proportion by volume is firstly kneaded by hand for about 40 seconds and then put into a measuring cup, as far as possible without bubbles. Material packaged in tubular plastic bags is put into the measuring cup directly from a commercially available mixing appliance (for example Pentamix® 2 from 3M ESPE AG). The filling level should be at least 30 mm.

Without any time delay, the filled measuring cup is then placed in the cup holder stand and the measuring spindle lowered centrally into the paste. The test is then started. The measured value, displayed as mPas in the display, is read 20 seconds after the start of the measurement.

Care must be taken that at no time during the measurement is the measuring cup carried along by the rotation of the spindle.

The term opening in the sense of the present invention is to be understood to mean both inlet openings and outlet openings. This depends on the direction in which the substances to be mixed flow or are pressed.

A mixer normally has two inlet openings and only one outlet opening.

Round, oval openings and/or openings of kidney or sickle shape, in particular openings with rounded edges and corners, are advantageous.

A shape of this type permits an optimized arrangement of the inlet openings around the accommodation opening

for the driveshaft, normally located in the center of a dynamic mixer. Furthermore, this shape permits the utilization of virtually the entire surface of a dynamic mixer which is available for the inlet openings.

The apparatus according to the invention preferably has at least two, but possibly also three or four, openings.

These openings are usually arranged symmetrically around the opening for the driveshaft.

The apparatus according to the invention, in the form of a dynamic mixer, normally comprises at least three components, in particular a baseplate, into which the inlet openings and the holding opening for the driveshaft are introduced, and a rotor which is rotatably mounted in the baseplate and to which mixing blades are fitted and a shaped groove to accommodate the driveshaft, and also the housing in which the rotor runs.

The shape of the groove for the driveshaft is any desired shape, under the assumption that a force sufficient to start mixing can be transmitted from the driveshaft to the mixing blades.

Openings with edges have proven to be beneficial for transmitting the torque from the driveshaft to the rotor. The shaped groove for the driveshaft is preferably triangular, rectangular, square, pentagonal, hexagonal, heptagonal, octagonal or has another geometric shape with edges.

Mixing element is to be understood to mean that part of the mixer which is rotatably mounted, has mixing blades and can be driven by a mixer shaft.

Delay chamber in the sense of the invention is to be understood to mean a chamber or a bypass channel through which a paste component has to pass before it can enter the mixing chamber. The delay chamber has an inlet opening, which normally coincides with the inlet opening of the mixer, and at least one outlet opening, which opens into the mixing chamber.

The shape of the delay chamber is in principle any desired shape. A shape extending along a curve about the longitudinal axis of the mixer has proven to be advantageous, in order to keep the overall length of the mixer short. The delay chamber preferably has the form of an annular segment which extends over an angular range from greater than 0 to less than 180°, preferably in the range from 90 to less than 180°.

The chamber has, inter alia, a boundary wall located in the flow direction of a paste component, on which the paste component backs up. According to the invention, the chamber also has at least one opening, which opens into the mixing chamber and which is arranged to be set back with respect to the boundary wall.

The term set back in the sense of the invention is to be understood to mean an arrangement in which the opening does not adjoin the boundary wall directly but is arranged offset from the latter.

If the delay chamber has only this one opening into the mixing chamber, this has the effect that the backed-up paste component does not get into the mixing chamber at the point at which the boundary wall is located but only at a point set back with respect to the latter in the flow direction. This opening is preferably set back with respect to the boundary wall along the circumferential direction, in particular by an angle in the range from 90 to 180° with its center in the mixer axis.

The paste component with the higher proportion by volume is thus normally guided initially in a curved shape about the longitudinal axis, backed up on the boundary wall there and only comes into contact with the paste component with the lower proportion by volume in the region of the mixing element.

As soon as the delay chamber has been filled, the paste component with the higher proportion by volume subsequently flowing in and entering the mixer advantageously experiences only one deflection of its direction, which is less than 90°, preferably less than 45°, before it enters the mixing chamber.

In this way, a reduction can be achieved in the force which is required to discharge highly viscous pastes, in particular, for example with a viscosity of greater than 800 Pas.

The ratio of the volume of the delay chamber to the volume of the mixing chamber is normally in the range from 1:1 to 1:20, preferably in the range from 1:3 to 1:5. The delay chamber normally has an absolute volume in the range from 0.1 to 10 ml, preferably in the range from 0.3 to 2 ml. The volume of the delay chamber also includes the region of the inlet opening which opens into the delay chamber. The volume of the mixing chamber results from the difference between the total volume provided by the housing of the mixer minus the volume of the delay chamber and the volume which is taken up by the mixing screw.

If the ratio lies outside this range, there is regularly either inadequate delay of one paste component or the mixer has too large a dead volume, associated with an undesirably large quantity of paste to be discarded.

The shape of the opening which opens into the mixing chamber is in principle any desired shape. In essence, round, rectangular and triangular openings are suitable. The opening area is normally only a few mm^2, preferably 1 to 100 mm^2.

In a preferred embodiment, the delay chamber has a plurality of openings, in particular two or three openings, which open into the mixing chamber. In this case, the further openings can also be located directly in the region of the boundary wall or adjoin the latter.

An opening into the mixing chamber which is arranged directly in the region of the boundary wall is advantageous if it is to be ensured that the air which would be compressed in the delay chamber by the inflow of the paste component to be delayed can escape into the mixing chamber. This is beneficial in particular if it is to be ensured that no air is included in the paste to be mixed. If the paste is a dental molding compound, air included in the mixed paste regularly leads to a debased quality of a bite impression taken by using the mixed paste.

The delay chamber can be arranged symmetrically or asymmetrically in the mixer. It can also extend only in one circumferential direction, but also in both circumferential directions.

In a further preferred embodiment, the set-back opening in the delay chamber is arranged in such a way that, at least at one point, it is opposite the inlet opening to the delay chamber. The opening in the delay chamber which opens into the mixing chamber is preferably half-offset with respect to the inlet opening. In this embodiment, it is thus theoretically possible for some of the paste component to get directly into the mixing chamber without previously being backed up in the delay

chamber. In particular in the case of highly viscous pastes, however, it has surprisingly been shown that this does not normally occur, but that the delay chamber is filled first.

In order to effect deflection of the flow direction of one of the paste components into the delay chamber, it is advantageous for a baffle surface to be arranged opposite the inlet opening into the delay chamber, which prevents the paste component entering the mixing chamber without being deflected into the delay chamber. This baffle surface normally results automatically if the opening of the delay chamber which opens into the mixing chamber is arranged to be offset somewhat laterally with respect to the inlet opening - as viewed in the flow direction.

In a particularly preferred embodiment, about 50% of the opening area which opens into the mixing chamber is opposite the inlet opening. In such an arrangement, the frictional forces occurring as a result of deflection of the paste stream are largely minimized without impairing the function of the antechamber.

Depending on the rotational speed of the mixing blades and/or the viscosity of the components to be mixed, the presence of a baffle surface may possibly not be absolutely necessary. The flow resistance produced by the rotating mixing blades may be sufficient in order that a paste component enters the delay chamber before it is mixed with the other paste component in the mixing chamber and discharged.

The ratio of the areas of the openings of the inlet for the paste component with the higher proportion by volume to the outlet opening of the mixer for the mixed paste is normally in the range from 1:1 to 1:5. A ratio differing from this has proven to be disadvantageous, in particular when mixing highly

viscous pastes, as a result of the frictional losses which occur.

Suitable materials from which the mixer can be produced comprise metal, glass and/or plastics, the latter being preferred.

Suitable plastics are, for example, those which have a modulus of elasticity in the range from 200 to 3000 N/mm² and/or an elongation at break in the range from 15 to 200%.

Suitable materials for the mixer comprise PA, PE, OPP, PP, PTFE, PC, PS and/or POM. The materials can also be used in fiber-reinforced and/or filled form.

Suitable fibers and fillers comprise glass fibers/particles and carbon fibers/particles.

Suitable mixers and/or cartridge fronts can be produced, for example, in the injection molding process, if necessary in a 2-component injection molding process. However, production by means of material-removing processes is also conceivable.

The mixer according to the invention can be used in all technological areas, in particular for mixing highly viscous, pasty and/or semifluid compounds.

This is generally understood to include substances which, in the stored state, are kept separately in at least two components and have to be mixed before use.

The following may be cited as examples: adhesives, joint sealing compounds, coatings.

The mixers according to the invention may preferably be used in the dental sector. The apparatuses according to the invention are particularly suitable for mixing

highly viscous molding materials which, for example, are pressed out of tubular plastic bags, which are inserted into suitable cartridges, by electrically driven pistons. Conceivable and possible is also the discharge of the materials from suitable cartridges, which are filled directly with the material without a tubular plastic bag being used.

Materials which may be cited as examples are silicon rubbers, polyethers, polyether silicones, epoxy resins and polyurethanes.

The subject of the invention is also the combination of a dynamic mixer and an electrically operated mixing appliance, on which the mixer can be placed or to which the mixer can be fitted. Suitable mixing appliances have a mixer shaft and one or more delivery pistons.

It has been shown that, in order to achieve a usable mixing result without mechanical detriment to the mixing appliance, the cartridges, the tubular plastic bags or the mixer, the conveying force which is transmitted via the pistons to the pastes to be mixed should not significantly exceed the magnitude of about 4000 N.

A suitable mixing appliance is described, for example, in EP 0 541 972 A.

The subject of the present invention is also a method for mixing at least two paste components with different proportions by volume.

Here, the method comprises the following steps:

a) discharging at least two paste components A and B from a container, preferably from a container similar to a cartridge, into which, if appropriate, tubular plastic bags can be inserted,

b) introducing the components A and B into a dynamic mixer which can be connected to the container,

c) mixing the components A and B by using the dynamic mixer,

d) discharging the mixture of A and B from the mixer.

The mixer used has a mixing chamber and a delay chamber placed upstream of the latter, which has a boundary wall that stops the paste stream in the flow direction.

The paste component A with the higher proportion by volume entering the mixer fills the delay chamber and is backed up on the boundary wall there before it is mixed with the paste component B and discharged from the mixer.

Preferred exemplary embodiment will be explained below using the drawings, in which:

Figure 1 shows an exploded drawing of a mixer according to DE 298 18 499 U.

Figure 2 shows an exploded drawing of the mixer according to the invention.

Figure 3 shows an exploded drawing of the mixer according to the invention according to figure 2 in a rear view.

Figure 4 shows a sectional drawing through the inlet region of the mixer.

The mixer according to figure 1 is known from the prior art. It has a baseplate 1 with two inlet openings 2 and 3, a housing 9 with an outlet opening 4 and a mixing element 6. The mixing element 6 is provided with mixing blades 7. The delay chamber 10 extends along a curve around the longitudinal axis of the mixer and is closed off by a boundary wall 14. Immediately on the boundary wall 14 there is an opening 12 for the paste component A, which opens into the mixing chamber. The paste component B with the lower proportion by volume opens into the mixing chamber via the opening 11.

The paste component A initially runs guided along the faces 1 and 15 and is stopped by the boundary wall 14 arranged transversely with respect to them. The opening 13 for the outlet of the component A from the delay chamber into the mixing chamber is arranged in the baffle plate 15 at a distance from the boundary wall 14, set back counter to the initial paste flow direction of the component A.

Figure 2 illustrates an embodiment of a mixer according to the invention in an exploded drawing. The mixer has substantially the same elements as the mixer illustrated in figure 1. In addition, however, the mixer according to the invention has an opening 13 which is set back with respect to the boundary wall 14. The opening 12, which adjoins the boundary wall 14 directly, is optional. The delay chamber 10 preferably extends along a curve around the longitudinal axis of the mixer and, inter alia, is formed by the boundary wall 14, the underside of the baseplate 1, the baffle plate 15 located opposite the inlet opening 2 and the circular-segment-shaped element 16.

In figure 3, the mixer according to figure 2 is illustrated from a different perspective. It is possible to see in particular the two inlet openings 2 and 3 for the two paste components A and B, which are integrally molded on the baseplate 1, the accommodating opening 5 for the mixing screw 6 and the six-cornered shaped groove 8, in which the driveshaft for the mixing screw 6 can engage.

Figure 4 shows a sectional drawing through the inlet region of the mixer according to figures 2 and 3. It is possible to see in particular the flow ducts for the two paste components A and B. The paste component B enters the mixer through the opening 3 and, without substantial deflection, passes via the opening 11 into the mixing chamber, in which the mixing blades 7

rotate. The paste component A enters the mixer via the opening 2, strikes the baffle plate 15, is deflected through about 90° there and led into the delay chamber along the circular-segment-shaped [lacuna]. The paste stream is stopped by the boundary wall 14; the air backed up can escape through the opening 12. As soon as the delay chamber has been filled, the paste component A can enter the mixing chamber via the opening 12 and, in particular, the opening 13 set back with respect to the boundary wall.

List of designations

1. Baseplate
2. Inlet opening A
3. Inlet opening B
4. Outlet opening
5. Accommodating opening for the driveshaft
6. Mixing element
7. Mixing blade
8. Shaped groove
9. Housing
10. Delay chamber
11. Opening for the paste B into the mixing chamber
12. Opening for the paste A into the mixing chamber
13. Set-back opening for the paste A into the mixing chamber
14. Boundary wall
15. Baffle surface
16. Circular segment

Patent Claims

1. A dynamic mixer for mixing at least two paste components A and B, A having a higher proportion by volume than B, comprising a housing (9) with at least two inlet openings for A (2) and B (3) and at least one outlet opening (4), in which a mixing element (6) is rotatably mounted in a mixing chamber, the housing (9) having at least one delay chamber (10), which has a boundary wall (14) that stops the paste stream in the flow direction and at least one opening (13) which opens into the mixing chamber, this at least one opening being set back with respect to the boundary wall.

2. The mixer as claimed in claim 1, this at least one opening (13) being opposite the inlet openings for A (2) at at least one point.

3. The mixer as claimed in one of the preceding claims, the at least one delay chamber (10) having a further opening (12) which opens into the mixing chamber.

4. The mixer as claimed in one of the preceding claims, the ratio of the volume of the delay chamber to the volume of the mixing chamber lying in the range from 1:1 to 1:20.

5. The mixer as claimed in one of the preceding claims, the ratio of the inlet opening for A to the outlet opening lying in the range from 1:1 to 1:5.

6. The use of the mixer as claimed in one of the preceding claims for mixing at least two paste components whose proportion by volume lies in the range from 1:2 to 1:10.

7. The use as claimed in claim 6, the paste with the higher proportion by volume having a viscosity of at least 800 Pas.

8. A combination of a mixer as claimed in one of claims 1 to 5 and a mixing appliance on which the mixer can be placed, the mixer and the mixing appliance, which has a conveying device for conveying the pastes, being coordinated with each other in such a way that the conveying force which the mixing appliance has to apply does not exceed 4000 N.

9. A method for mixing at least two paste components A and B, A having a higher proportion by volume than B, comprising the following steps: a) discharging A and B from a container by using delivery pistons, b) introducing A and B into a dynamic mixer which can be connected to a container, the mixer having a mixing chamber and a delay chamber which comprises a boundary wall that stops the paste stream in the flow direction, c) mixing A and B by using the dynamic mixer, d) discharging the mixture of A and B from the mixer, A being led into the delay chamber before being mixed and discharged with B, being backed up there and being able to get into the mixing chamber from the delay chamber via an opening which is set back with respect to the boundary wall.

10. The method as claimed in claim 9, the paste component A not needing to be deflected through 90° in the mixer before it gets into the mixing chamber.

11. The method as claimed in either of claims 9 and 10, the paste component A substantially no longer being deflected after it has filled the delay chamber.

Fig. 1:

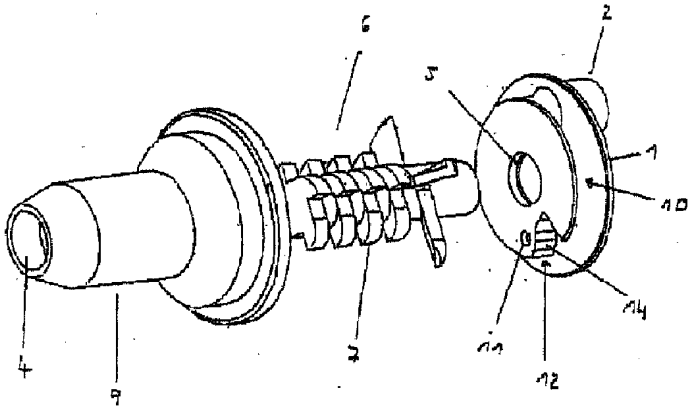


Fig. 2:

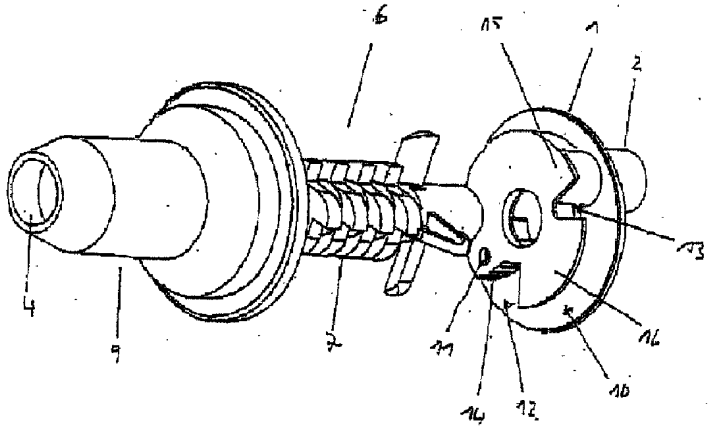


Fig. 3:

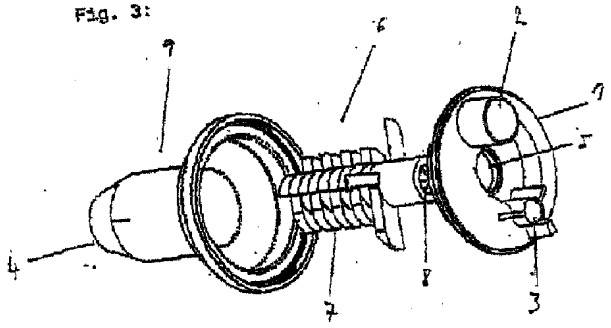


Fig. 4: